Plant Pathology Circular No. 229
October 1981

Fla. Dept. Agric. & Consumer Serv.
Division of Plant Industry

FUSARIUM WILT OF CITRUS IN FLORIDA

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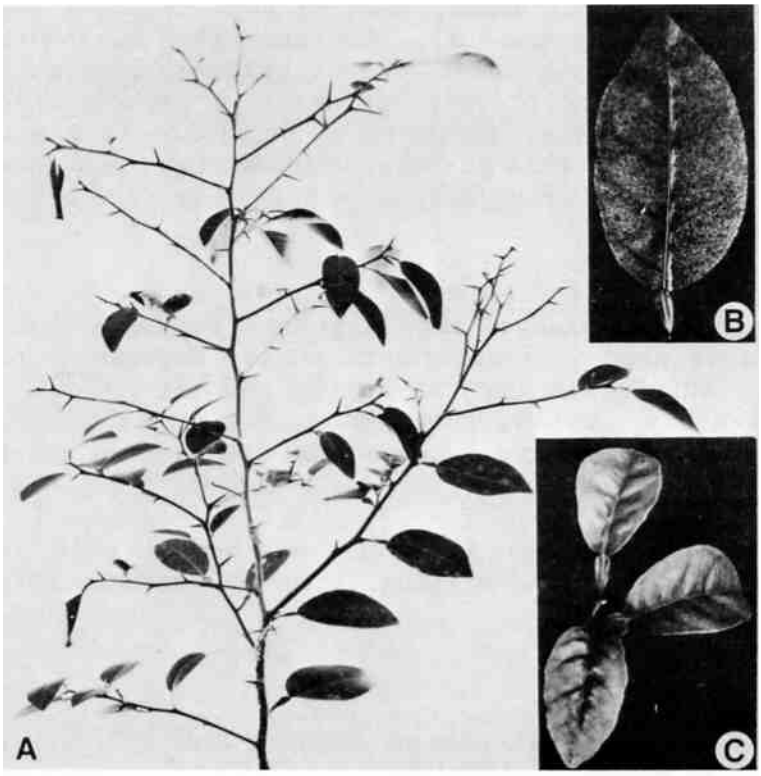
A wilt and dieback disease of certain species of greenhouse-grown citrus seedlings has been reported in Florida (2,3). The disease was first observed on Mexican limes (Citrus aurantiifolia (Christm.) Swingle) which were being used to index plants for citrus tristeza virus. The cause of the wilt and dieback of Mexican lime is Fusarium oxysporum (Schlecht.) emend. Snyd. et Hans. f. sp. citri Timmer (2).

In addition to Mexican lime, Rangpur lime (C. X limonia Osbeck), Milam (a variant of C. limon (L.) Bum. f. 'Rough', C. volkameriana Pasq., and C. amblycarpa (Hassk.) Ochse. are also susceptible to F. oxysporum f. sp. citri (2,3). Milam is used extensively in Florida as a rootstock, because it is highly resistant to spreading decline caused by the burrowing nematode, Radopholus similis (Cobb) Thorne. Citrus volkameriana is becoming increasingly popular in Florida as a rootstock, because it may be more resistant to citrus blight than rough lemon (C. limon (L.)Burm. f. 'Rough') which is a commonly used and highly blight-susceptible rootstock. In Brazil, F. oxysporum has been associated with stunting and mild wilt of field-grown Mexican lime grafted on to Rangpur lime rootstock (1) and may be similar to the pathogen reported in Florida (2). The following species and hybrids of citrus have been found to be tolerant to F. oxysporum f. sp. citri: Alemow, (C. macrophylla West.), calamondin (X Citrofortunella mitis (Blanco) J. Ingram & H. E. Moore), Carrizo citrange (Poncirus trifoliata (L.) Raf. X C. sinensis (L.) Osb.), citrumelo (P. trifoliata X C. X paradisi MacFady.'Swingle'), Cleopatra mandarin (C. reticulata Blanco 'Cleopatra'), Etrog citron (C. medica L. 'Etrog'), grapefruit (C. X paradisi), large-flowered trifoliate orange (P. trifoliata), lemon (C. limon 'Eureka'), limequat (C. aurantiifolia (Christm.) Swingle X Fortunella sp.), Rangpur lime X Troyer (C. limonia X (P. trifoliata X C. sinensis), rough lemon (C. limon 'Rough'), Rusk citrange P. trifoliata X C. sinensis), sour orange (C. aurantium L.), sweet lime (C. aurantiifolia), and sweet orange (C. sinensis). While the pathogen did not cause disease symptoms in these tolerant plants, the fungus was nonetheless isolated from the roots of these selections. Further, if a wilt-tolerant species such as rough lemon or sweet orange is budded onto susceptible Mexican lime rootstock, the entire plant may exhibit wilting and dieback (3).



Fig, 1. Symptoms caused by Fusarium oxysporum f. sp. citri on naturally infected Mexican lime seedlings. A) Wilt, leaf abscission, and general dieback of the entire plant; B) reticulate chlorosis of mature leaf; C) epinasty and chlorosis of young leaves – an early symptom of infection.

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At present, Fusarium wilt of citrus is not recognized as a problem in groves or nurseries in Florida. However, the following should not be overlooked: the pathogen has been reported in Florida greenhouses (2); rootstocks shown to be susceptible to F. oxysporum f. sp. citri constitute a significant portion of the Florida citrus acreage; and a similar disease has appeared in citrus groves in Brazil (1). Further, fusarial wilt pathogens of other crops have shown a tendency to produce new strains or races that may have a different host range than the original strain.

SYMPTOMS. The first symptoms on naturally infected Mexican limes are a mild reticulate chlorosis and epinasty (drooping) of young leaves (Fig. 1B and 1C), followed by wilting, leaf abscission, and dieback of young twigs (Fig. 1A). Gum exudation usually occurs at various points along the dying twigs (2).

Small seedlings of Mexican lime are seldom affected. Seedlings begin to develop disease as they reach grafting size at 6-12 months of age. Symptoms often may appear only on one side of the plant then quickly progress to the remainder of the plant. The root system is not visibly affected even on plants with severe dieback. The wilt pathogen is readily isolated from stems and roots of diseased Mexican lime and can sometimes be isolated from leaf petioles (2). Isolation of the fungus from various spatially removed plant parts indicates that the pathogen is systemic.

Seedings of Rangpur lime, Milam, C. volkameriana, and C. amblycarpa exhibited reticulate chlorosis, mild wilt, and stunting but did not die when inoculated with F. oxysporum f. sp. citri (2).

CONTROL. The pathogen is predominantly soil-borne; however some evidence suggests that the pathogen may also be carried by air (2). As with other soil-borne pathogens, the following practices are to be encouraged: use of pathogen-free soil; use of pathogen-free or resistant stock; and the practice of sanitary procedures in the nursery. Since air-borne dispersal may occur, it would be desirable to have a fungicide available, but none is registered for this purpose. Benomyl has been shown experimentally to offer some control if applied frequently at a high rate, and before infection has been extensively established (2).

Citrus and other hosts that may harbor F. oxysporum f. sp. citri should be contained in the greenhouse and should not be outplanted into a grove. Research should continue on this disease. Information is needed on non-citrus hosts, sources of the fungus, the ability of the fungus to survive in natural soils, and the effect of various fertilizers, microbial antagonists, and various environmental factors on infection. Such research is needed to assess potential damage from the disease and to develop appropriate control measures.

SURVEY AND DETECTION. Submit citrus seedlings that are exhibiting wilt for diagnosis. Vascular discoloration in stem tissue of wilting citrus is characteristic of Fusarium wilts.

LITERATURE CITED.

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